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The Cosmology of Climate Change: Intercorrelations Between Increased Global Temperature, Carbon Dioxide and Geomagnetic Activity

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Abstract

Recent global warming is correlated strongly with not only levels of carbon dioxide but also increased geomagnetic activity. Factor analysis indicated these three variables share the same source of variance. Quantitative statistical analyses and physical equations suggest the presence of variable structures in spacetime through which the solar system is moving that may be responsible for the doubling of the solar coronal magnetic field, increased geomagnetic activity and the elevating temperatures on Earth and Mars. The apparent relationship to human activity would be epiphenomenal.

Keywords: geomagnetic activity; global warming; human activity; Cosmological variables; solar system movement

1. Introduction

A singular G-2 star can be considered a major factor affecting climate and life forms on Earth. The correlations between recent insidious elevations in global temperature and green house gases, which include water vapour as well as carbon dioxide, have been attributed in large part after the year 1945 to the behaviour of human beings (NAS 2010a,b,c; Tett et al, 1999). However concomitant with the increased magnitudes for human activity since about the year 1900 there has been a doubling of the solar corona (Lockwood, et al, 1999) and a gradual increase in average geomagnetic activity (Persinger, 2009a). A similar increase in global temperature has been observed recently

within a more restricted time frame on Mars (Fenton et al, 2007) which is presumably independent of anthropogenic activities.

Correlations are not necessarily causations. For problems that are not amenable to the benefits of direct experimentation, the presence of other factors that are responsible for the occurrence of both variables that constitute the correlation must always be considered. These include changes in solar activity, alterations in the angle and orbit of Earth (Duhau and Jager 2010; Miyahara et al., 2010) and fluctuations in geomagnetic activity. Both El-Borie and Al-Thoyaib (2006) and Persinger (2009a) have shown that at least half of the variance in the global warming can be accommodated by the energy available from the upward drift in geomagnetic activity. That these factors associated with solar activity have been responsible for the epiphenomenal relationship between global warming, human activity and the concomitant increases in green house gases, would affect both humanity's approach to the solutions as well as the focus in the search for mechanisms.

As the mass of the solar system moves in the order of 10^5 m/s through the galaxy it never occupies the same space. Traditionally the structure of the dimensions of space smaller than that occupied by the classical elements of matter (10^{-15} m) has been ignored, assumed to be homogeneous, or relegated to the theoretical formulations of Kaluza-Klein (Freedman and Nieuwenhuizen, 1985) or Riemannian space-time mathematics. However if the organization of space-time is a consequence of quantum mechanics (Audretsch, 1983) and the "vacuum" is composed of zero point fluctuations (Puthoff, 1989a,b), then intrinsic changes at the level of 10^{-35} m (Planck's length) would ultimately affect the subtle interactions between processes that compose matter (Joseph, 2010). There is quantitative support (Abramenko, 1958) for this supposition and dynamic changes or fluctuations in the topology of space have been considered (Joseph, 2010; Konstantinov, 1997).

In this paper the following concept is developed. There may be semi-periodic gradients in the characteristics or organization of submatter space as the solar system moves through the galaxy as it traverses the universe that affects the stability of aggregates of matter. Because the sun constitutes 99% of the mass of the solar system very small changes in those gradients might be amplified to produce changes, such as expansions and contractions of the solar corona, shifts in solar wind velocity, and alterations in geomagnetic activity that affect global temperature and human activity.

2. Geomagnetic Activity, Dynamic Pressure, and Global Temperature Relationships

The original and perspicacious research by El-Borie and Al- Thoyaib (2006) explored the relationship between the approximately 0.6 +/- 0.2 deg C increase in global surface temperature (GST) over the last century with solar-related variations. They found correlations in the range of 0.50 (+/-0.5) between GST and increases in geomagnetic activity as defined by the global aa (average antipodal) index and sunspot (Rz) numbers. A similar magnitude (r=0.50) correlation between local air temperature and Rz for the years 1817 to 1970 was even reported 40 years ago (Blanco and Catalano, 1975).

Solar activity was strongly associated with increased averaged peak annual irradiance during solar maxima from about 1367.3 W/m^2 between 1870 and 1900 to 1368.2 W/m^2 by the late 1980s (Duhau and Jager, 2010; Miyahara et al., 2010). The correlations between arctic surface air temperature during the years 1875 to 2000 with total solar irradiance and atmospheric CO_2 were 0.64 and 0.44, respectively. When 10-year running means were employed (Soon, 2005) the correlation between arctic air temperature and irradiance rose to 0.89 while the value for CO_2 remained similar (0.47). The emergence of the effect with temporal increments of larger than one year would be consistent with El- Borie and Al-Thoyaib (2006) who found a powerful lag of about 7 years between the geomagnetic activity and subsequent values for GST.

Stamper et al (1999) reported an unprecedented correlation of 0.97 for the coupling function between solar wind velocity, which is directly related to solar activity, and magnetospheric energy. The combination of interplanetary magnetic field strength, the density (concentration) of solar wind, and its velocity explained almost all of the 39% increased in aa values that were observed over three solar cycles. Persinger (2009a) calculated the energy associated with such increases in dynamic pressure from the solar wind that could be potentially stored within Earth's magnetic field would also accommodate the increase in "global warming". Persinger (1980) reviewed the multiple publications during the 1950s and 1960s that showed moderate to strong positive correlations between increased geomagnetic activity and both regional temperatures and more robust weather patterns.

Assuming an initial dynamic pressure during the late 19th century to be 2.5 nPa the potential energy within the volume of the lower troposphere (10 km thickness) would be about 5.6×10^{17} J per year. An increase of dynamic pressure by 1 nPa and its associated energy would be equivalent to adding the energy of 1,200, 20 kT ($1\ kT = 4.2 \times 10^{12}$ J) blasts per year (about 3/day) to the energy equivalent of 5,500 such blasts per year. Within a volume that is equal to the shell that extends one earth radius, the net energy from an

increase of only 1 nPa dynamic pressure would increase to an equivalence of about 7.7 x 10^7 20 kT blasts per year (or about 2 per sec).

The equivalent increase in magnetic field strength from the relationship PV (the product of pressure and volume)=J=(B^2/2u) x m^3 (where B is the magnetic field strength, u=the permeability constant, and m=volume) is about 16 nT. This is within the range measured by others (Siscoe et al, 1968; Su and Konradi, 1975) from changes in ground level geomagnetic measures from sudden increases in dynamic pressure near Earth's orbit. The congruence of the two solutions might be considered evidence of a physical connection.

The quantitative bases of the relationships were further pursued in the present exploration through detailed statistical analyses using SPSS (VAX) software for the years 1880 through 2008 according to the data supplied by M. A. El-Borie. A visual representation of the annual deviation values (from about 15 deg C) for GST and the aa values (in nT) is shown in Figure 1. The increased values for both are conspicuous. The correlation coefficient between year and global geomagnetic activity (aa) is 0.55 (30% shared variance) while the coefficient for global temperature is 0.83 (69% shared variance). The correlation between GST and aa was 0.55. The magnitude of the year-GST coefficient was significantly larger ($z=4.52$, $p<.01$) than the coefficient for the year-aa relationship.

However, when the contribution from the variance associated with year was first removed the first order partial correlation between variations in global temperature and geomagnetic activity was no longer significant statistically ($r=-.02$). These results suggested there is a condition increasing as a function of year since about 1900 that is responsible for both the increased geomagnetic activity and the increased global warming.

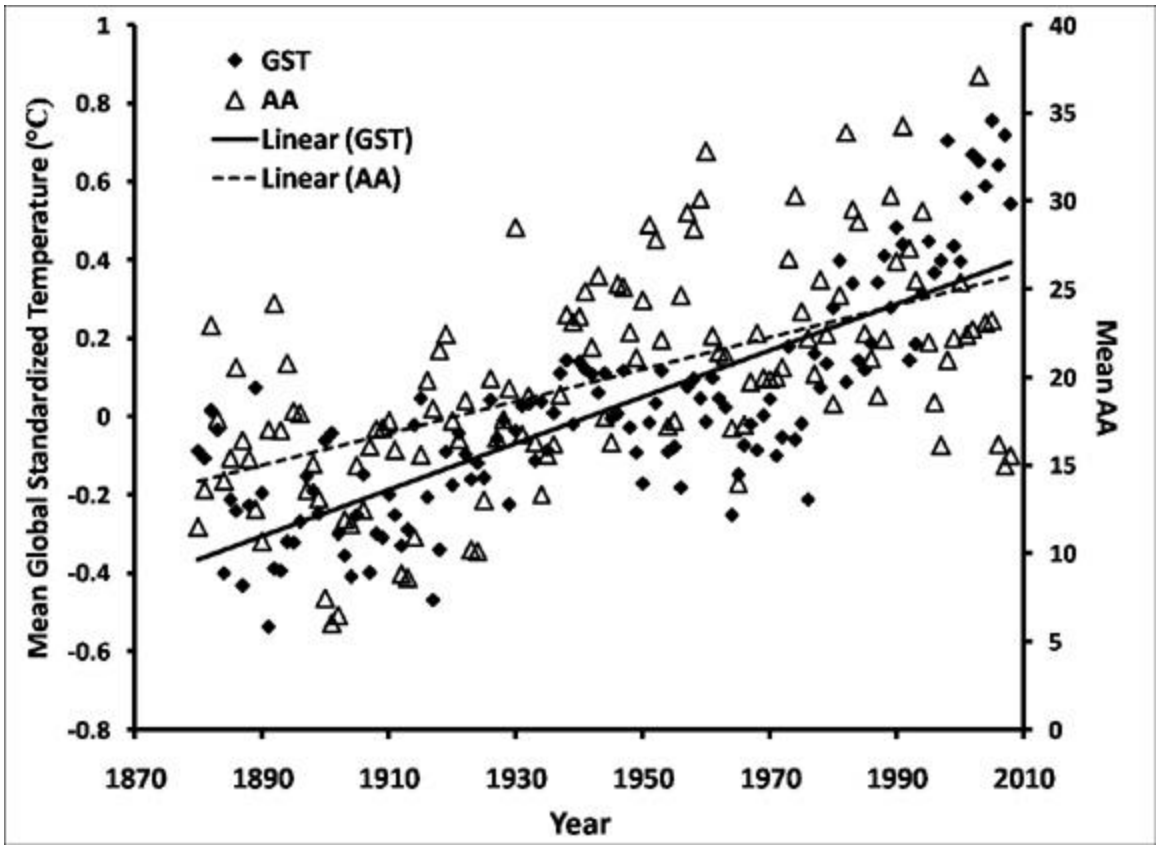

Figure 1. Annual mean global standardized temperature as deviation in deg C (closed diamonds) and average geomagnetic activity (open triangles) in nanoTesla (aa values) as a function of years.

To discern the maximum strength of association between geomagnetic activity and changes over time during the last 120 years a symmetrical lag/lead multiple regression analysis was completed with global temperature as the dependent variable. A symmetrical lag/lead is employed to reveal any temporal asymmetry of an effect. If variables from before and after the criterion interval enter an equation than a non-specific effect is more likely.

In the present analyses, lag 7 for GST was employed as the dependent variable while no lag and year lags between 1 and 14 for aa activity were used as independent (predictor) variables. [Solar activity analyses employing either the natural log, log base 10, or raw Rz values produced similar strength effects]. This means that if lags 7 through 14 entered the equation the sources occurred during the same year or the years before the criterion period; if the entering lags were between 0 and 6, the source occurred afterwards. Stated alternatively, this means the geomagnetic activity preceded or succeeded changes in GST, respectively.

To minimize inclusion of minor variance the numbers of variables allowed to enter the equation were set=2. Inclusions of additional lags were found by inspection to add little additional sources of explained variance. Because multiple regression does not allow variables with redundant variance to enter the equation lags with similar zero-order strength correlations with GST were examined but were also found not to add any additional information.

The results were clear. Only annual aa values that preceded the dependent variable (GST) entered the equations. The linear combination of aa values the year before and 6 years before were correlated 0.68 [$F(2,110)=46.02$, $p < .001$] with GST (see Figure 2). This suggested that an increased geomagnetic activity followed by comparable increases six to seven years later were associated with increased GST the following year. The pattern is similar to the intrinsic 7 year cycle reported by El-Borie and Al-Thoyaib (2006).

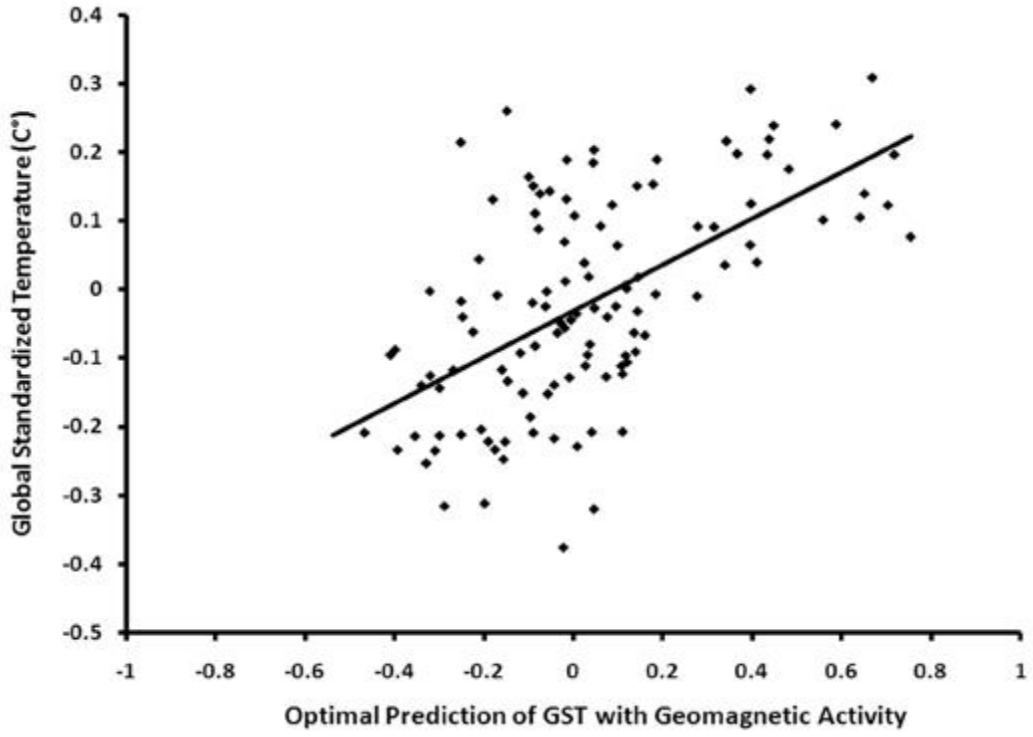

Figure 2. Scattergram for the annual deviations in standardized global temperature (vertical axis) as a function of the optimal combination of global geomagnetic activity during previous years for the interval 1880 through 2008.

3. Residuals Between Geomagnetic Activity and Global Temperature as Inferences

The hypothesis that there are changes in the structure of submatter space that exert subtle influence upon the sun's activity as the solar system moves through different space within the galaxy as it moves through the universe requires a closer examination of the changes in global temperature on the earth, the geomagnetic activity of the earth, and the temperature on Mars. They have been also concomitant with the doubling of the solar coronal magnetic field. There have been transient anomalies, such as on 11 May, 1999 (Lazarus, 2000) when the solar wind values decreased to 0.2 particles/cc (compared with the typical 10 particles/cc). Although the density returned to normal within a day, high-energy electrons in the magnetosphere remained severely depleted for about two months.

Other anomalies that might be considered deviations from a purely intrinsic sinusoidal process could include the irregular fading of the southern equatorial belt on Jupiter (that occurred again between late 2009 and early 2010), the delayed initiation of solar cycle 24, and the variability in solar cycle length (Lassen and Friis-Christensen, 1995). The Maunder Minimum, between the years 1645-1710, has received multiple explanations that primarily involve intrinsic solar parameters rather than its response to alterations in submatter space (Duhau and Jager, 2010; Miyahara et al., 2010). Even the last century of elevation of solar activity was considered by Solanki et al (2004) as exceptional. Their data indicated that a similar period of high activity occurred more than 8,000 years ago. Responses by Usoskin et al (2004) to counterarguments reiterated the finding that the present high level of sunspot activity is unprecedented during the previous millennium.

The concept of periodicities and quasiperiodicities in time for astrophysical motions is well known while the concept of "periodicities" in spatial gradients has been less frequently examined. However there are congruities within both microcosm and macrocosm. For example the relationship "square root (n(n+1)" aptly describes the changes in spatial density of matter from the nucleus represented as orbital angular momentum in quantum mechanics (Seel, 1966; Hume-Rothery, 1963) as well as the harmonics of resonances in frequency variations (Campbell, 1967). Periodicities in time have equivalents in the variable distribution of characteristics of space.

Given that variations in solar activity and the correlative interplanetary magnetic field and solar wind may primarily drive the magnitude of geomagnetic activity, discrepancies between the observed and expected values for geomagnetic and solar activity may suggest a hidden factor. To test the possibility residuals were obtained for each year for the linear regression (r=0.60) between annual aa values and the log base 10 (to minimize the

influence of extreme values) of Rz numbers the same year. As shown in Figure 3, the correlation between the residuals and year was 0.55. The positive slope of .07 (standard error=.01) would suggest that over the last 100 years there has been an increase in geomagnetic activity of about 7 nT that is not accommodated by the linear relationship with this inference of solar activity.

One interpretation is that as the solar system moves through new space in the direction of Vega, there is a source of variance increasing geomagnetic activity, the solar corona, and potentially global temperatures on earth and Mars. There has also been an increase in the magnitude of the peak in positive residuals that was evident during the years 1930, 1943, 1952, 1960, 1974, 1982, 1984, 1991, 1994 and 2003. These values were two standard errors of the estimate or more above the regression line which indicates the excursions are not likely to be spurious fluctuations; the year 2003 displayed the largest deviation.

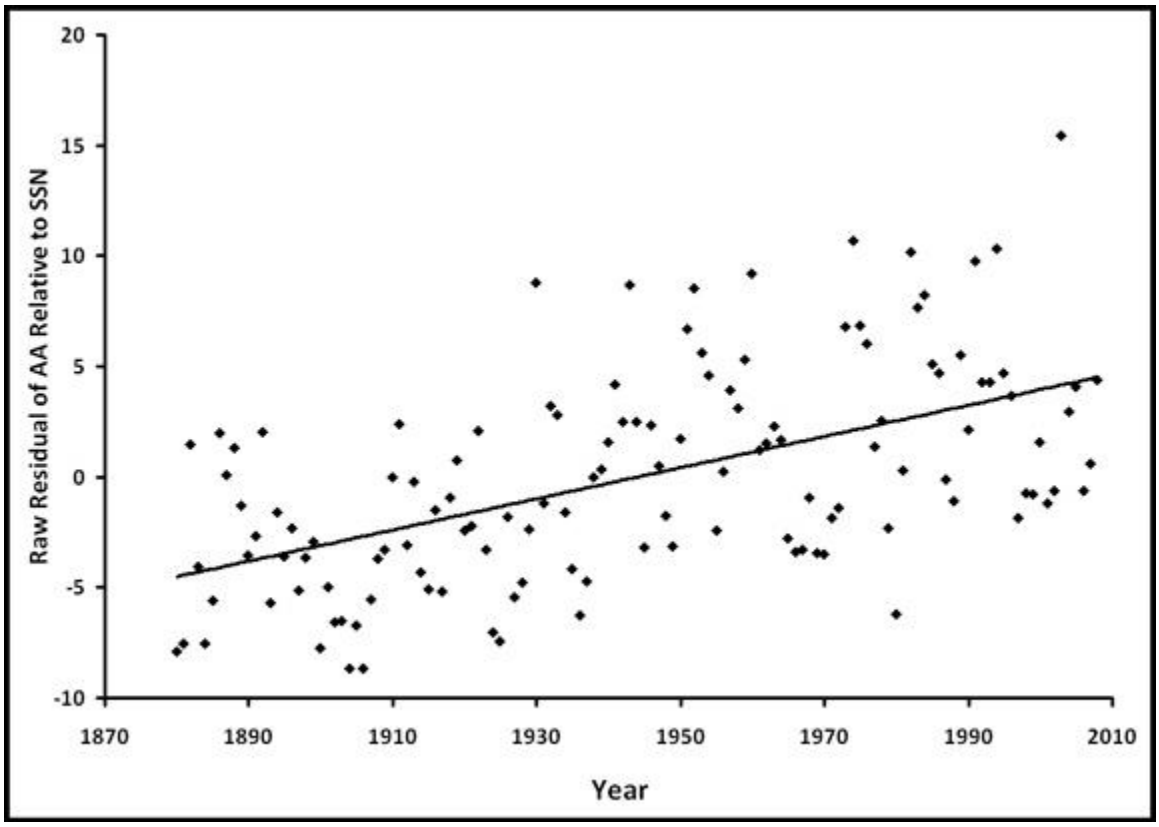

Figure 3. Absolute residuals from the equation for the prediction of aa (geomagnetic values) by the log10 of the Rz (sunspot) values for the years 1880 through 2008.

The correlation between the numbers of years between these successive peaks during this last approximately 70 years period was -.55. This would be consistent with some condition in the space through which the solar system is moving that is displaying heterogeneity with increasing spatial frequency. The last extreme in 2003 is also the moment of the interval between 2003 and 2008 where the inflection for the non-linear increase in GST occurred. The increased number of extreme values that deviate from the predicted values in GST from solar activity would suggest the recent addition of another factor to the rise in GST and would be consistent with the conclusion of Erlykin et al (2009) who found that less than 14% of global warming between 1956 and 2009 could be attributed to standard measures of solar activity.

4. The CO_2 Variable

The mean and standard deviation of global CO_2 between the year 1880 and 2008 were 318.98 and 26.01 ppm, respectively. The zero order correlation between CO_2 and year was .92 (compared to GST and year=0.81). The slope indicated an increase of 6.4 ppm per decade with an upward inflection beginning between 1970 and 1975. Global geomagnetic activity was correlated .45 with CO_2 (and 0.43 with GST). However factor analysis (loading scores in parentheses) for GST (0.91), CO_2 (0.95), aa (0.66) and year (0.95) yielded a single factor (eigen value=3.07) that explained 77% of the variance and is effectively identical to the 10-year running mean between solar irradiance and arctic surface temperature between 1875 and 2000 (Soon, 2005).

From the perspective of numerical variability, this means that all four variables share the same source of variance. Once the contributions from annual drift and geomagnetic activity were removed from the zero order correlation of .87 (76% shared variance) between CO_2 and GST the association between the two was reduced to 0.55 (30% shared variance). This also does not differ significantly ($z < 1.50$) from the annual-mean correlation of 0.47 reported by Soon (2005) for arctic wide air temperature.

The quantitative association between GST and CO_2 suggested a multicollinearity. Canonical correlation between GST and CO_2 (dependent or predicted) with the factor scores that emerged from simultaneous consideration of aa values over 12 years as covariates (or predictor variables) resulted in a canonical correlation of 0.75 (57% of variance explained). GST and CO_2 were both loaded with an $r > 0.91$ on the root while the three factor scores, dominated by the geomagnetic activity during the previous 5 to 7 years, ranged between 0.56 and 0.59. The configuration was consistent with

increased periods of geomagnetic activity as precursors to the elevations in CO_2 and GST.

5. Reconsideration of and Speculations: The Dynamic Shape of the Solar System and Structure of space

Based upon the assumption of 1 proton/m^3 as an average density for space within the universe (an average for intergalactic and intragalactic values), Persinger (2009b) estimated the average pressure within the universe to be 1.5×10^{-11} Pa. The solution for this value when applied to the estimated volume for various geometries based upon a radius in the order of 10^{26} m, resulted in a total universal mass of 10^{52} kg which is similar to estimates employing other assumptions and sampling procedures. From J(energy)=P(pressure) times volume, the estimated total energy was found to be 10^{69} J which is congruent with the energy equivalent for mass in the solution for general relativity $R_{uv}-(1/2\ Rg_{uv})+Lg_{uv}=[(8piG)/c^4)T_{uv}]$. In this instance R and g refer to the structure of space-time, T is the matter and energy affecting that structure, L (lambda) is a reciprocal of 10^{26} m (estimated radius of universe) and G and c are classic constants for gravitation and the velocity of light, respectively. If this approach is valid, then solving for B from the equation $PV=[B^2/2u]\ m^3$ yields an equivalent magnetic field strength for 1.5×10^{-11} Pa of about 19 nT. This value is similar to the more well known relationship with velocity=B/square root of the product of u and density; B in this instance would be about 14 nT if the velocity of light were assumed. Both values are within the range of the approximately 10 nT extracted for the non-potential toroidal component of the earth's magnetic field for which etiological hypotheses continue to be developed (Winch et al, 2005). The calculated values are of course averages based upon the assumption of a homogeneous distribution of protons in space outside of the heliopause. If we assume this equivalence is an intrinsic feature of space and shows a modest range in variability, then the solar system could be moving through space whose intrinsic magnetic equivalence is within the range associated with the increase in geomagnetic activity over the last 100 years.

That gradients of magnetic fields exist in interstellar space was reported by Opher et al (2009). The observation of the "magnetic fluff of hydrogen and helium atoms at temperatures around 6300 K" along the boundaries of the heliosphere as it moves through intergalactic space was not expected by those authors but would be required to support the hypothesis explored here. Such changes in magnetic field density and implicitly dynamic pressure might be considered indicators of periodic spatial gradients within space. Although the strength of the magnetization being encountered by the solar system is in

the order of 0.5 nT at the present time, a factor of 10 less than the calculations in the previous paragraph, magnetic field strengths for molecular clouds have ranged between 3.8 and 7.3 nT (Kazes and Crutcher, 1986).

The presence of these variable "ribbons" of "high-pressure" material (Opher, et al, 2009) along the heliosphere in the direction of movement of the solar system through space may have influenced the system's organization more than expected. At a distance of 16×10^{12} m the time required for the solar system moving at about 10^5 m/s to traverse through successive diameters of solar-system space would be about 10 to 11 years, the classic periodicity of solar activity.

If there were quasiperiodic organizations of space through which the solar system moves during its 240 million years of rotation around the center of the Milky Way, the systematic contact with these "impedances" may have influenced the dynamic organization within the system. The effect would be analogous to a motor boat moving at constant velocity over a lake with a relatively fixed distance between the waves. The amplification effects for a combination of resonance and periodicity can affect the three-dimensional motion.

The width of the standing spatial "waves", if they are reflected in the approximately 10 to 11 year solar cycle, would be in the order of 10^{13} m. Assuming a distance of about 2.7×10^{20} m (9,000 parsecs) from the galactic center this means the intrinsic structure of this spatial quasiperiodicity would be about 10^{-8} of the length of the rotational perimeter. Movement through intrinsic variations in the characteristics of space-time would affect the sun primarily but would also affect a lesser mass such as the earth. From this perspective the correlation of 0.47 between solar activity and numbers of earthquakes (Odinstov et al, 2007) and the latter's occurrence with sudden increases in solar wind velocity reiterate the critical distinction between correlation and causation. We cannot as yet completely exclude the possibility that a recondite factor could cause the changes in solar activity, solar wind velocity, geomagnetic activity and terrestrial seismicity. They would be intercorrelated because they all share and are dependent upon this factor (Persinger and Lafreniere, 1977).

Traditionally the shape in space-time has been strongly related to gravity (Audretsch, 1983; Hawking and Penrose, 1996). Gravity could be considered an induced effect produced by changes in quantum-fluctuation energy of the vacuum when matter is present and is related to Casimir forces (Puthoff, 1989a,b). One of the vacuum quantum effects associated with an intrinsic

frequency of the vacuum-electromagnetic zero-point-fluctuation energy is the creation of particles from the vacuum by external fields along changing boundaries (Bordag, et al, 2001; Koren and Persinger, 2010). The complicated physical connection between the energies existing within the 10^{-35} m range and the point-like electron with a finite mass has been resolved theoretically by Puthoff (2007) and Joseph (2010).

Such an approach is not incompatible with the Parker model for thermal expansion of the solar corona (Pisanko, 2005). The existence of grand minima and maxima in solar activity can be predicted by dynamo action driven by differential rotation and the mirror asymmetry of solar convection. However these models require inclusions of fluctuations in the alpha-effect. It is associated with an electromotive force parallel (rather than normal) to the mean magnetic field (Usoskin, et al, 2009) which emerges from averaging the solar magnetic field over an aggregate of turbulent pulsations. In essence the alpha-effect fluctuations represent intrinsic "noise" or random processes whose origins could be congruent with zero point fluctuations. Within different levels of scientific discourse, "random" or "statistical" variations usually reflect a non-optimal selection of the temporal and spatial increments of measurement relative to that which defines the integrity of the phenomenon (Persinger and Lafreniere, 1977). As indicated by Moss et al (2008) the Parker model is based upon the assumption that sunspot numbers are related linearly to the magnetic energy in the solar dynamo. However there is the possibility of a threshold whereby active regions (and hence potential changes in the velocity and density of the solar wind) only emerge if the toroidal field strength exceeds a critical level. One could speculate that subtle fluctuations that affect this threshold would be coupled to the electromagnetic zero point potential energies as the sun moves through space.

The observations by Vladimirskii (1995), who was attempting to understand why the measurements of G (the gravitational constant) with classical instruments (torsion balances) can't be made with precision greater than 10^{-4}, support this association. He found that during increased (Ap >30) global geomagnetic activity the coefficient for G was between .005 to .0005 lower compared to less intense periods. Independently, Minakov et al (1992) showed theoretically that resonance phenomena for the gravitational-to-electromagnetic field coupling showed the most powerful amplification near the second global Schumann resonance. Surprisingly, few researchers appear to have considered the significance of these observations.

First order calculations reveal a quantitative connection between the change in frequency (wc) of the vacuum zero-pointfluctuations or Zitterbewegung

motion when applied to Earth's fundamental physical parameters and changes in geomagnetic activity. According to the derivations by Puthoff (1989a) $wc2=[pi\ c^5/hb\ G]^{0.5}$ where c is the velocity of light and hb is Planck's constant divided by 2pi. The difference in wc^2 for the G coefficient of 6.6728 during minimal geomagnetic activity and 6.6675 for Ap >30 (which includes values up to about 1000 nT) employing Vladimirskii's (1995) values is about 10^{83} Hz^2. The total energy for the product of the earth's mass (5.9×10^{24} kg) and its cross-sectional area (about 10^{14} m^2) multiplied by this value for wc^2 per 3-dimensional voxel of Planck's length (about $0.2 \times 10^{105}/m^3$) would be about 10^{16} J. The earth's magnetic dipole moment of 8×10^{22} Am^2 would require a change of about 10^{-6} T (or 1000 nT) for this magnitude of energy which is consistent with Vladimirskii's (1995) observation. However for this quantitative convergence to have substance there must exist a property of space-time that allows the value for the smallest unit to be equal to the sum of any collection of units (like a parallel circuit). Such properties can exist at least in mathematical space (Kerner, 1958).

6. The Periodicity of Solar-Human Activity

Over the last approximately 4 billion years life forms on this planet have obtained their energy from a number of sources but primarily from solar energy the sum of which has been about 33×10^{33}J. It should not be surprising that even a first order calculation from this total value during the last approximately 10^{17} sec approaches the equivalent biomass (in the order 10^{16} kg) of the planet. From this perspective the activity of human beings would be correlative to changes in the recent global warming of the last 100 years and caused by other factors.

There is a plethora of correlational studies showing moderate strength associations between solar activity (Mikulecky, 2007), social behaviours such as cognitive initiatives (Pales and Mikulecky, 2004) wars (Vladimirsky and Kislovsky, 1998; Zhang et al, 2007), population growth (Zaitseva and Pudovkin, 1995), and general motivation (Starbuck et al, 2002). Even experiences considered "mystical" that often anticipate social movements, are associated with small, approximately 10 to 20 nT, increases in geomagnetic activity (Booth et al, 2005).

Recent correlation studies have clearly shown that reliable quantitative changes in the power of specific frequencies within the human brain occurred during increased geomagnetic activity (Babayev and Allahverdiyeva, 2007). The energy available from this geomagnetic perturbation and related power densities within the atmosphere are within the range generated by cerebral

activity (Mulligan et al, 2010). Similar changes in quantitative electroencephalographic activity occur when the geomagnetic field is simulated experimentally. In fact experimentally-generated weak (50 nT) 7 Hz amplitude-modulated magnetic fields that most closely simulate natural geomagnetic activity produce the same effect size in evoking seizure activity in rodents (Michon and Persinger, 1997) as does the natural condition.

Given these associations it is not surprising that a 10 year solar and geomagnetic periodicity for the alternations in functional asymmetry of the two hemispheres of human brain has been reported (Volchek, 1995). If structure dictates function, then even small shifts in the behaviours associated with alterations in cerebral hemispheric dominance when manifested within billions of human beings within a generation would affect cultures and economies.

Quantitative increases in experiences and symptoms associated with temporal lobe activity in adults are elevated if the perinatal geomagnetic activity exceeded 30 nT (Hodge and Persinger, 1991). These intensity fields have been shown experimentally, in rats, to affect the subtle organization of the portions of the brain (the hippocampus) associated with memory and emotion (St-Pierre et al, 2008). Hence from the perspective of this approach the conditions that have led to the increase in social activity are related to the same source of variance that is causing recent global warming.

7. Conclusion

Quantitative analyses of the increase in global temperature, carbon dioxide levels and geomagnetic activity indicate they share the same source of variance. The energy available from the enhanced geomagnetic activity which has been coupled to the expansion of the solar coronal magnetic field could accommodate the increases in global temperature for both the Earth and Mars.

The author speculates, based upon inferences and general calculations as yet untested, there is an intrinsic organization in space through which the solar system moves as it orbits the center of the galaxy. Spatial quasi-periodicities in the characteristics of this submatter space, may be responsible for the coherent changes within the whole system. Human activity within the last 100 years would be a consequence of these changes rather than a primary source of global warming.

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